Augmented Reality in Android

ECE 150/251

Augmented Reality VS Virtual Reality

Augmented Reality VS Virtual Reality

	AR	VR
Camera	Essential	Not necessary
Delivery Method	Mobile devices	Head-mounted display
Alignment with real world	Yes	No
Android SDK	Vuforia	Google Daydream

Augmented Reality in Android

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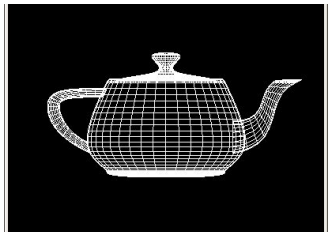
Vision-based localization technique


Image Target

+


Camera

+


Computer Graphic

=


AR

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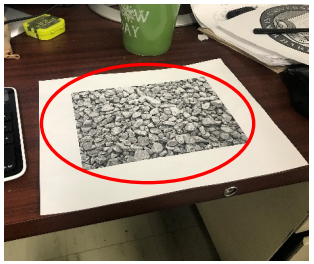
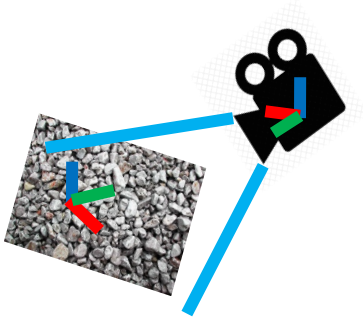
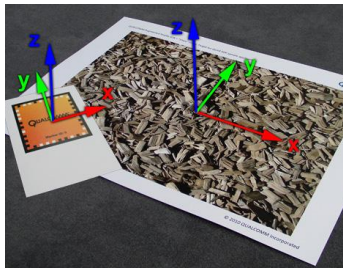
AR Workflow



Maker Detection



Camera Pose Estimation



Local Coordinate System Creation

Rendering

AR Workflow – Marker Detection

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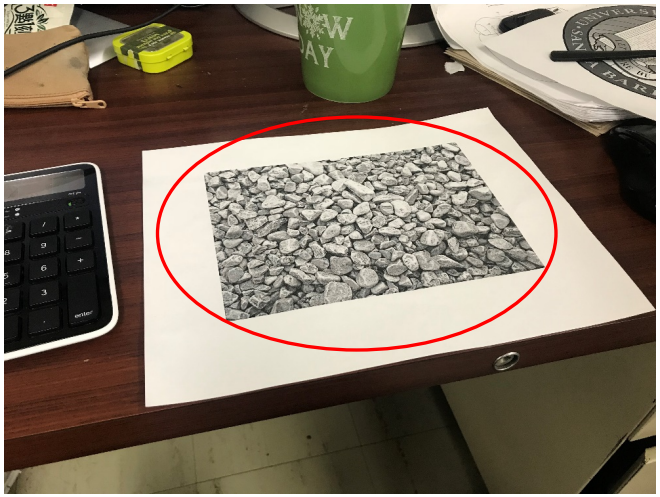

Marker is an image which contains key distinguishable features. These features are invariant to the location, rotation, and scale of the marker.

AR Workflow – Camera Pose Estimation

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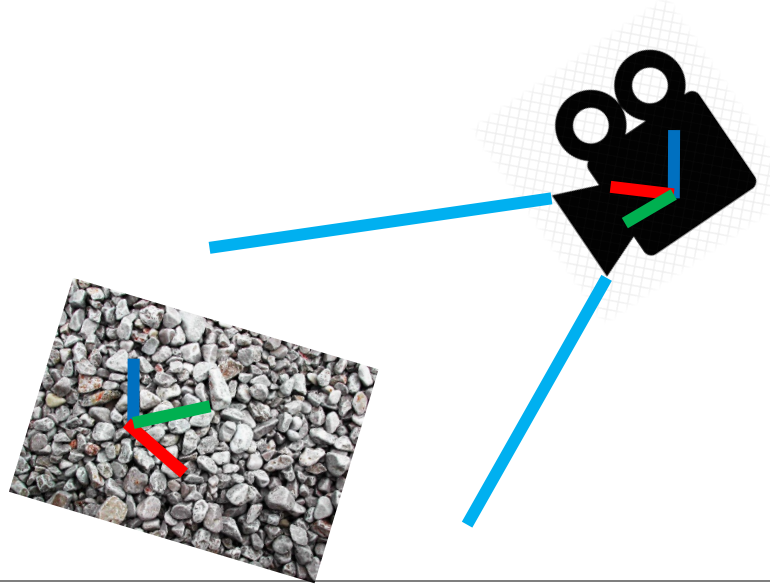

Based on the image features, Vuforia can back project the image and estimate the location and the orientation of the camera relative to the mark in 3D space.

AR Workflow – Local Coordinate System Creation

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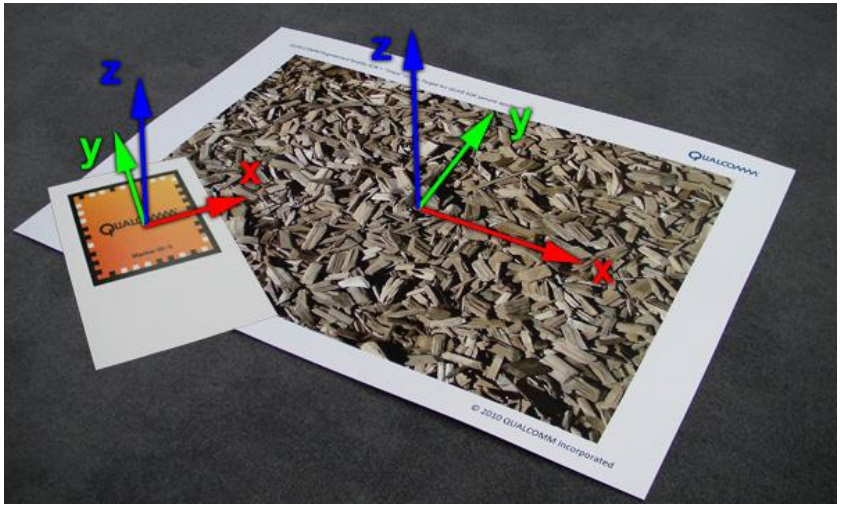

Each image target and frame marker define a local coordinate system with (0,0,0) in the center (middle) of the target.

The Vuforia SDK uses right-handed coordinate system.

AR Workflow – Rendering

The final step is using graphics tool to render 3D objects and align to the local coordinate system of the marker.

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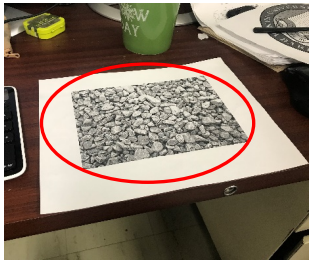
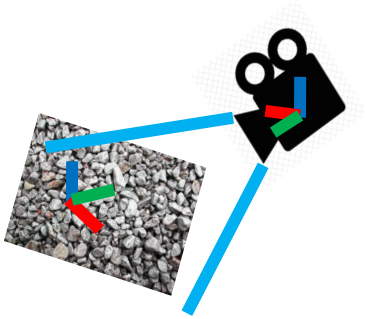
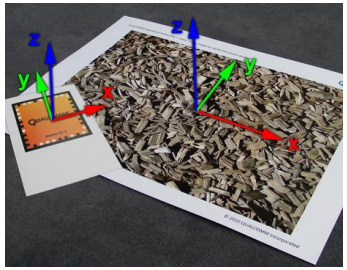
AR Workflow



Maker Detection



Camera Pose Estimation



Local Coordinate System Creation

Rendering

Demo

A demo shows how to set up Android Studio for Vuforia projects.